MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

SRM Number: 2617
MSDS Number: 2617
SRM Name: Carbon Dioxide in Nitrogen (Nominal Amount-of-Substance Fraction – 500 µmol/mol)

Date of Issue: 05 July 2011

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Description: This SRM mixture is supplied in a DOT 3AL-specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of useable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-580 brass valve, which is the recommended outlet for this carbon dioxide mixture. NIST recommends that this cylinder **NOT** be used below 0.7 MPa (100 psig).

Substance: Carbon Dioxide/Nitrogen Compressed Gas Mixture.

Other Designations: Carbon Dioxide (carbon oxide)/Nitrogen (dinitrogen) compressed gas mixture.

2. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 2 Fire = 0 Reactivity = 0

Note: The health and safety information included in this MSDS is for nitrogen, compressed gas, the main component of the gas cylinder. The concentration of carbon dioxide in this NIST cylinder is below the reportable limits for hazardous components (1 %) and/or carcinogens (0.1 %), as required by OSHA, 29 CFR 1910.1200 (g)(2)(i)(C)(1), for MSDS information.

Physical Hazards: Cylinder may rupture or explode if exposed to heat.

Major Health Hazards: Difficulty breathing.

Target Organ: Blood.

Potential Health Effects (Short Term Exposure Only)

Inhalation: This nitrogen compressed gas mixture is a simple asphyxiant. Release in an enclosed space may result in asphyxiation. The symptoms of asphyxia depend on the rapidity with which the oxygen deficiency develops and how long it continues. In sudden acute asphyxia, unconsciousness may be immediate. With slow development, there may be rapid respiration and pulse, air hunger, dizziness, reduced awareness, tightness in the head, tingling sensations, incoordination, faulty judgment, emotional instability, and rapid fatigue. As the asphyxia progresses, nausea, vomiting, collapse, unconsciousness, convulsions, deep coma, and death are possible.

Skin Contact: Not applicable.

Eye Contact: Not applicable.

Ingestion: Ingestion of a gas is unlikely.

Listed as a Carcinogen/Potential Carcinogen

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component	CAS Number	EC Number (EINECS)	Nominal Concentration[(a)]
Nitrogen	7727-37-9	231-783-9	>99%
Carbon Dioxide	124-38-9	204-696-9	500 µmol/mol

[(a)]The concentration of carbon dioxide (see Certificate of Analysis) in the identified NIST cylinder are below the reportable limits for hazardous components (1 %) and/or carcinogens (0.1 %), as required by OSHA, 29 CFR 1910.1200 (g)(2)(i)(C)(1), for MSDS information.

EC Classification: No classification available.

EC Risk (R No.): Not published.

EC Safety (S No.): Not published.

EC Risk/Safety Phrases: See Section 15, "Regulatory Information".

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to well ventilated (uncontaminated) area. If breathing is difficult, qualified personnel may administer oxygen. If not breathing, qualified personnel should give artificial respiration. Seek immediate medical attention.

Skin Contact: Not applicable.

Eye Contact: Flush eyes with plenty of water.

Ingestion: Ingestion of gas is unlikely.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard applicable to the identified NIST cylinder. Cylinder may rupture or explode if exposed to heat.

Extinguishing Media: Use extinguishing agents appropriate for surrounding fire.

Fire Fighting: Move cylinder from fire area if it can be done without personal risk. Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point (°C): Not applicable.

Method: Not applicable.

Autoignition (°C): Not applicable.

Flammability Limits in Air (Volume %)

Upper Explosive Limits (UEL): Not applicable.
Lower Explosive Limits (LEL): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Stop leak if possible without personal risk. Isolate hazard area and deny entry. Stay upwind and keep out of low areas. Refer to Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Secure cylinder to prevent physical damage. Keep valve protective cap on cylinder when not in use. Keep separated from incompatible substances. Store in a well-ventilated area. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Nitrogen Gas:

ACGIH (TLV): Simple asphyxiant.
UK OES: Simple asphyxiant.

Carbon Dioxide: The amount of carbon dioxide in this cylinder does not meet or exceed the OSHA PEL listed for carbon dioxide. The following values given for **pure** carbon oxide are for informational purposes only.

Component: Carbon Dioxide

NIOSH (TWA):	5 000 ppm
NIOSH (IDLH):	40 000 ppm
ACGIH (TWA):	5 000 ppm
ACGIH (STEL):	30 000 ppm
OSHA (TWA):	9 000 mg/m^3 (5 000 ppm)

Ventilation: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Respirator: If workplace conditions warrant a respirator, a respiratory protection plan that meets OSHA 29 CFR 1910.134 must be followed. Refer to the "NIOSH Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84" for applicable certified respirators.

Eye Protection: Wear safety goggles. An eye wash station and quick drench shower should be readily available near of handling and use areas.

Personal Protection: Safety goggles are recommended. Wear gloves to prevent skin exposure. Wear safety shoes when moving cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Nitrogen Gas
Appearance and Odor	colorless and odorless
Molar Mass	28.01 g/mol
Molecular Formula	N_2
Water Solubility	1.6 % @ 20 °C
Boiling Point	–196 °C (–321 °F)
Vapor Density (Air=1)	0.97

10. STABILITY AND REACTIVITY

Stability: X Stable _____ Unstable

Stable at normal temperature and pressure. Stability classification applies to the identified NIST cylinder.

Conditions to Avoid: Avoid inhalation of material or combustion by-products. Protect from physical damage. Cylinder may rupture or explode if exposed to heat.

Incompatibilities: Lithium may ignite in nitrogen gas. Titanium will burn in nitrogen.

Fire/Explosion Information: Refer to Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition or combustion produces oxides of nitrogen.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation _____ Skin _____ Ingestion

Nitrogen Gas: Simple asphyxiant.

Health Effects (Acute Exposure): See Section 2 "Hazard Identification".

Medical Conditions Generally Aggravated by Exposure: Respiratory disorders.

12. ECOLOGICAL INFORMATION

Environmental Summary: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Compressed gas, n.o.s. (Carbon Dioxide in Nitrogen); UN1956; Hazard Class 2.2.

15. REGULATORY INFORMATION

U.S. REGULATIONS

CERCLA Sections 102a/103 (40 CFR 302.4): Not applicable to the identified NIST cylinder.
SARA Title III Section 302 (40 CFR 355.30): Not applicable to the identified NIST cylinder.
SARA Title III Section 304 (40 CFR 355.40): Not applicable to the identified NIST cylinder.
SARA Title III Section 313 (40 CFR 372.65): Not applicable to the identified NIST cylinder.
OSHA Process Safety (29 CFR 1910.119): Not applicable to the identified NIST cylinder.
SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21)

ACUTE HEALTH:	Yes
CHRONIC HEALTH:	No
FIRE:	No
REACTIVE:	No
PRESSURE:	Yes

STATE REGULATIONS

California Proposition 65: Not regulated.

CANADIAN REGULATIONS

WHMIS Information: Not provided for this material.

EUROPEAN REGULATIONS

EC Classification: No classification assigned.
EC Risk Phrases: Not available.
EC Safety Phrases: Not available.

NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): Listed on inventory.

TSCA 12(b), Export Notification: Not listed.

16. OTHER INFORMATION

Sources: ChemADVISOR, Inc., MSDS *Nitrogen*, 06 April 2011.

ChemADVISOR, Inc., MSDS, *2 Comp. Mix Carbon Dioxide <5000 ppm Bal. Oxygen or Inert Gas*, 06 April 2011.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.